

BURLINGTON'S CLEAN WATER RESILIENCY PLAN

An Update on **Infrastructure Investments** and
Integrated Permitting

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A large stack of orange and white corrugated pipes, likely for wastewater or stormwater infrastructure, filling the background of the top-left quadrant.

"BURLINGTON ORDERS CLOSE OF TWO BEACHES AFTER WASTEWATER RELEASES..."

VTDIGGER | 2018

AGING WASTEWATER & STORMWATER INFRASTRUCTURE

REPLACE & MODERNIZE
EXISTING INFRASTRUCTURE

EXCESS PHOSPHOROUS FROM WASTEWATER & STORMWATER

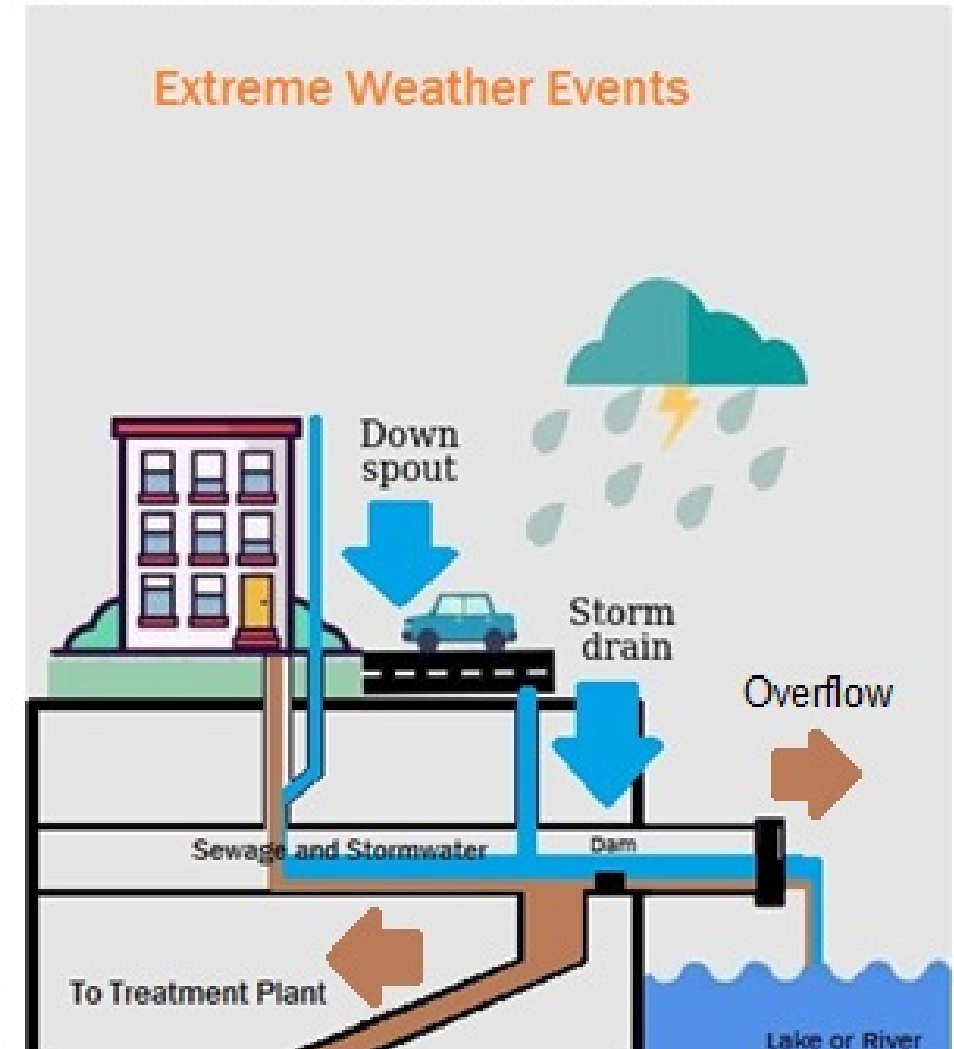
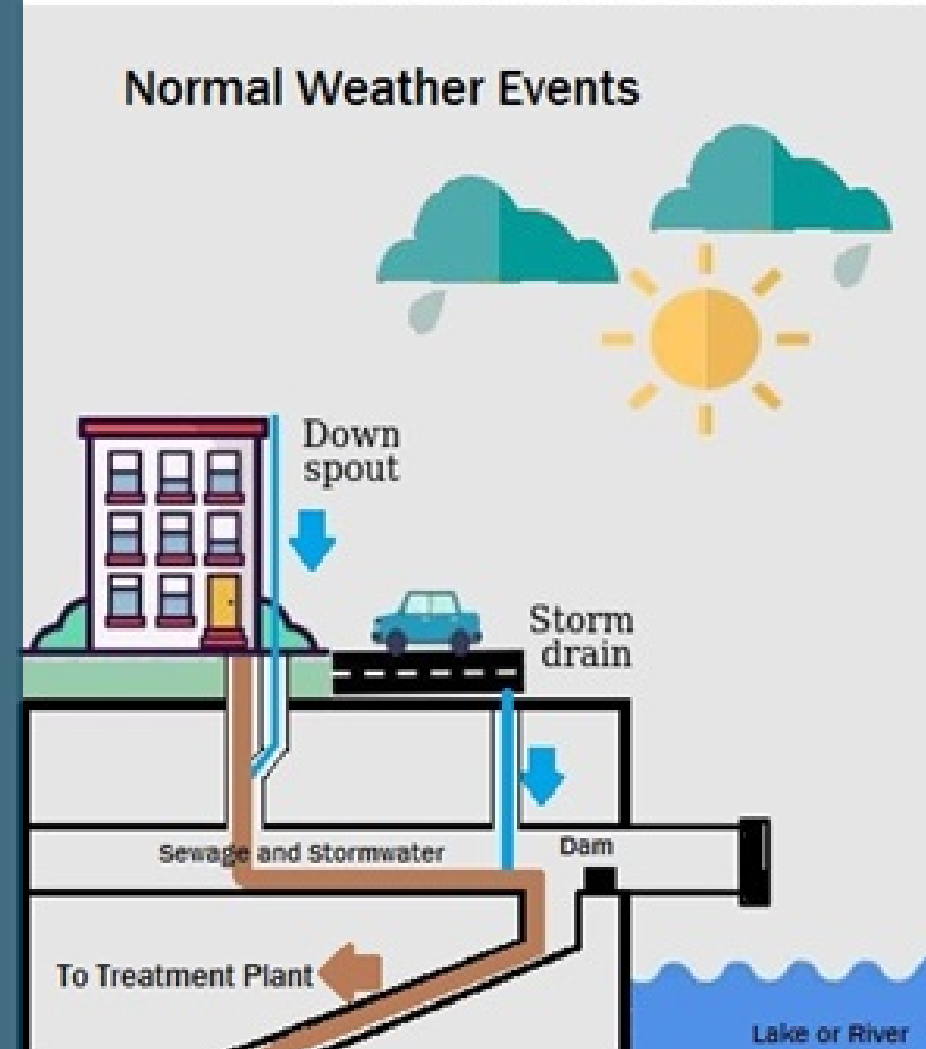
IMPLEMENT PHOSPHOROUS
REDUCTIONS

A photograph of a body of water with a visible cyanobacteria bloom, appearing as a dark, textured mass in the foreground.

"CYANOBACTERIA BLOOMS CLOSE ALL OF BURLINGTON'S PUBLIC BEACHES..."

VTDIGGER | 2021

OTHER WATER QUALITY GOALS



COMBINED SEWER OVERFLOWS

Remove or store stormwater to reduce frequency of CSOs

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EROSION & HABITAT IMPACTS ON URBAN STREAMS

Reduce excess stormwater flows

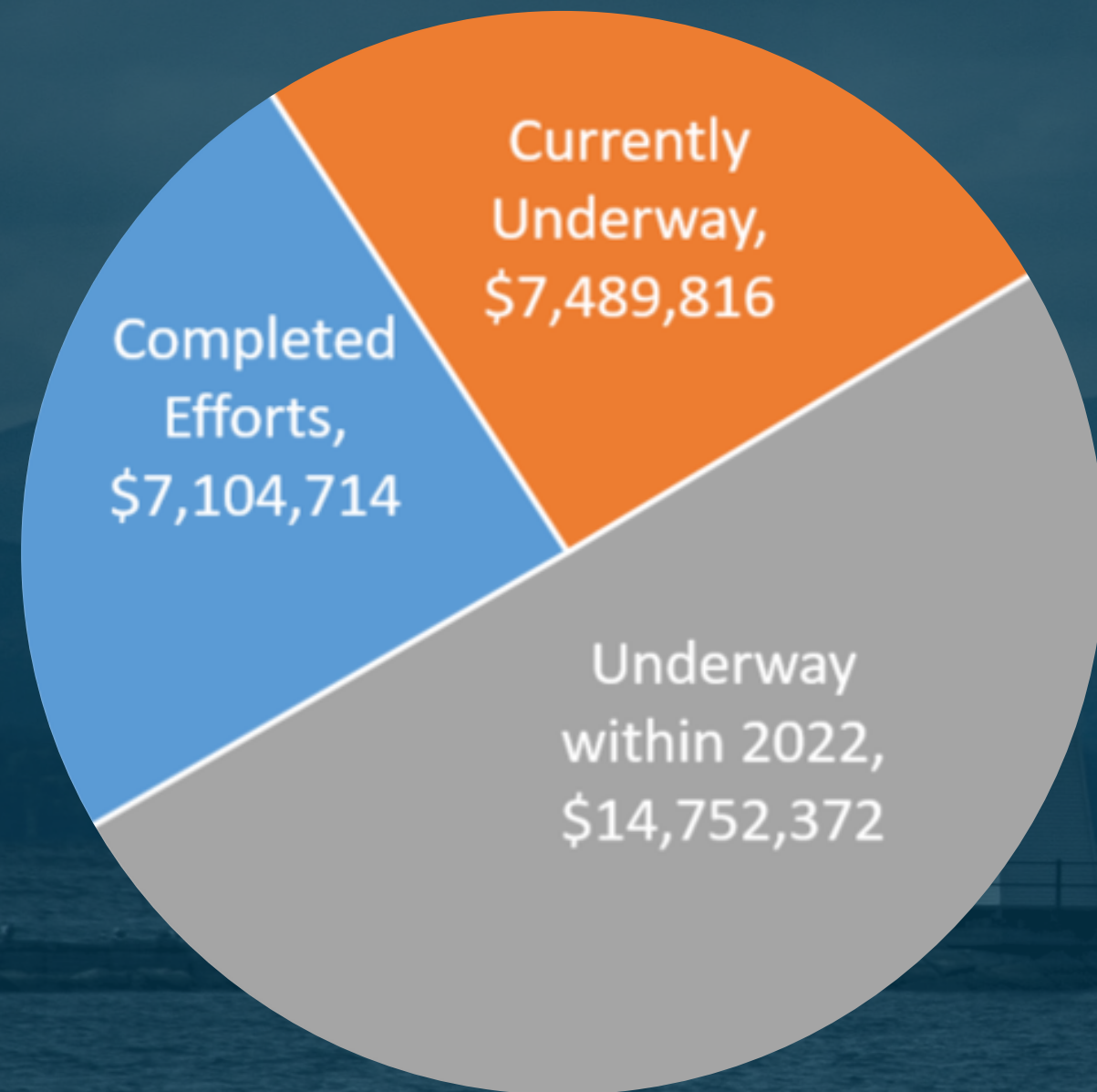
CLEAN WATER RESILIENCY

Improving the resiliency of our Clean Water systems through **7 key strategies** in Wastewater and Stormwater:

1. Investing in Wastewater Treatment Plans
2. Updating Wastewater Pump Stations
3. Relining and Rehabilitating Sewer and Stormwater Pipes
4. Repairing Stormwater Outfalls
5. Implementing Industrial Pollution Prevention Programs
6. Constructing Green Infrastructure
7. Integrated Planning to meet this generation's water quality challenges

\$30MM 2018 Bond Vote to start this work - 92% approval

RESILIENCY INVESTMENTS TO DATE



Voters approved \$30 M in 2018
2018 Bond will be >80% programmed
by end of 2022

List of Clean Water Resiliency Projects

updated 3/9/22

Funding Type

Clean Water Resiliency Bond (includes project costs that will be forgiven)

Project Development Loan (includes project costs that will be forgiven)

Grant

italics indicate estimate

Type	Completed Efforts	Expense
Construction	SCADA (computerized controls)	\$ 425,000
Construction	Disinfection Systems (all three plants)	\$ 2,689,600
Planning	WWTF Planning	\$ 463,000
Planning	Integrated Water Quality Plan	\$ 1,272,910
Construction	Pump Station Upgrades Flynn & Fletcher	\$ 1,663,802
Construction	CSO-GSI South End	\$ 590,402

Type	Currently Underway	Expense
Design	CSO-GSI Old North End	\$ 117,628
Planning	Industrial Pollution Prevention Program	\$ 398,881
Planning	Remaining Pump Stations Preliminary Engineering	\$ 350,000
Construction	Collection System Relining (Wastewater)	\$ 3,336,190
Construction	Collection System Relining (Stormwater)	\$ 2,091,417
Design	Phase II Wastewater Upgrades	\$ 1,095,700
Design	Manhattan Drive Outfall Repair	\$ 100,000

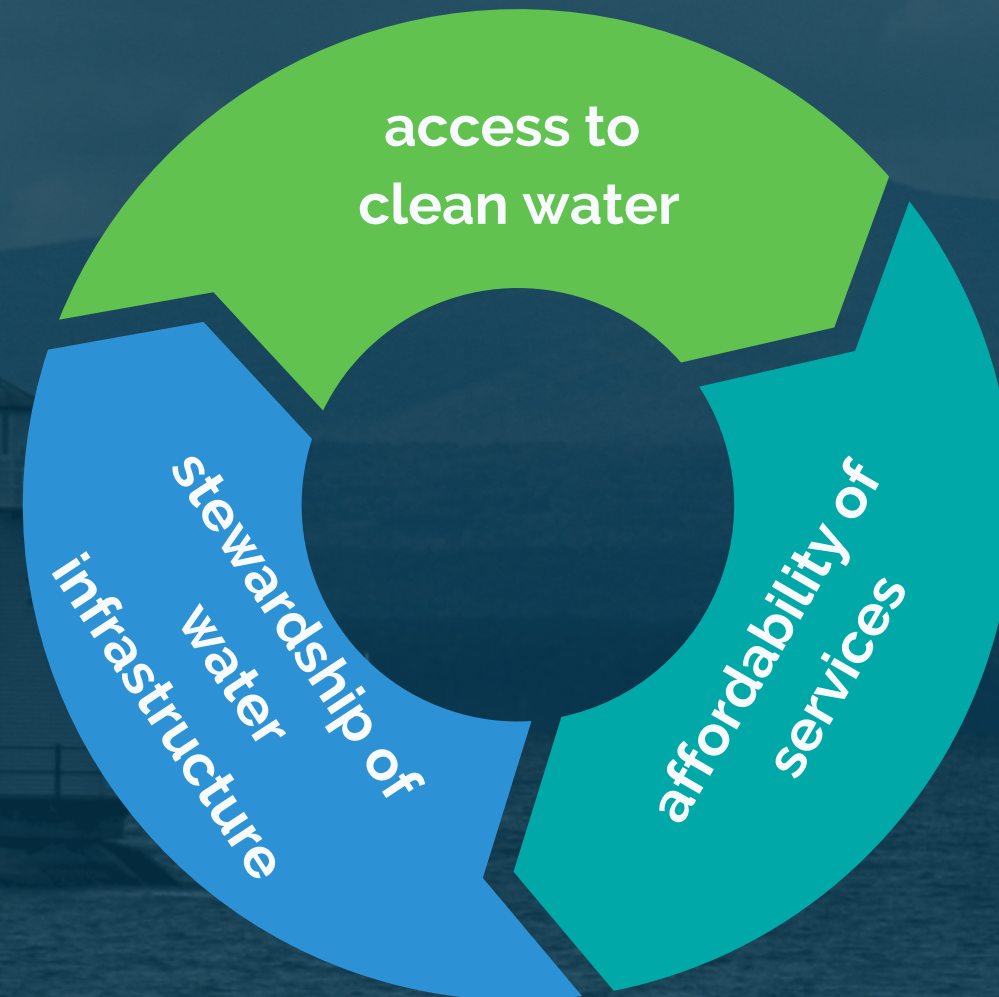
Type	Underway within 2022	Expense
Construction	Phase II Wastewater Upgrades	\$ 12,000,000
Construction	Manhattan Drive Outfall Repair	\$ 1,132,000
Construction	CSO-GSI Old North End	\$ 322,479
Planning	Hydraulic/Hydrologic (Sewer Capacity) Phase II Study	\$ 751,391
Preliminary Design	Tertiary Phosphorus Removal Treatment Pilot Study	\$ 298,832
Preliminary Design	CSO Storage Tank	\$ 247,670

Total Work Completed or Programmed	\$ 29,346,902
Total work under voter authorized bond	\$ 24,214,709
Bond Authorization Remaining from 2018 \$29.958M	\$ 5,743,291

RATEPAYER AFFORDABILITY



- **Fixed Fee Waiver**
 - Low-income
 - 65+
 - Non-Profit Housing Organization
- **Rebates**
 - Sewer lateral inspections
 - WaterSense fixtures



RATE STRUCTURE ADJUSTMENTS

- **Lifeline** rate tier
- **User class**-based rates



**"BURLINGTON ORDERS CLOSE
OF TWO BEACHES AFTER
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VTDIGGER | 2018

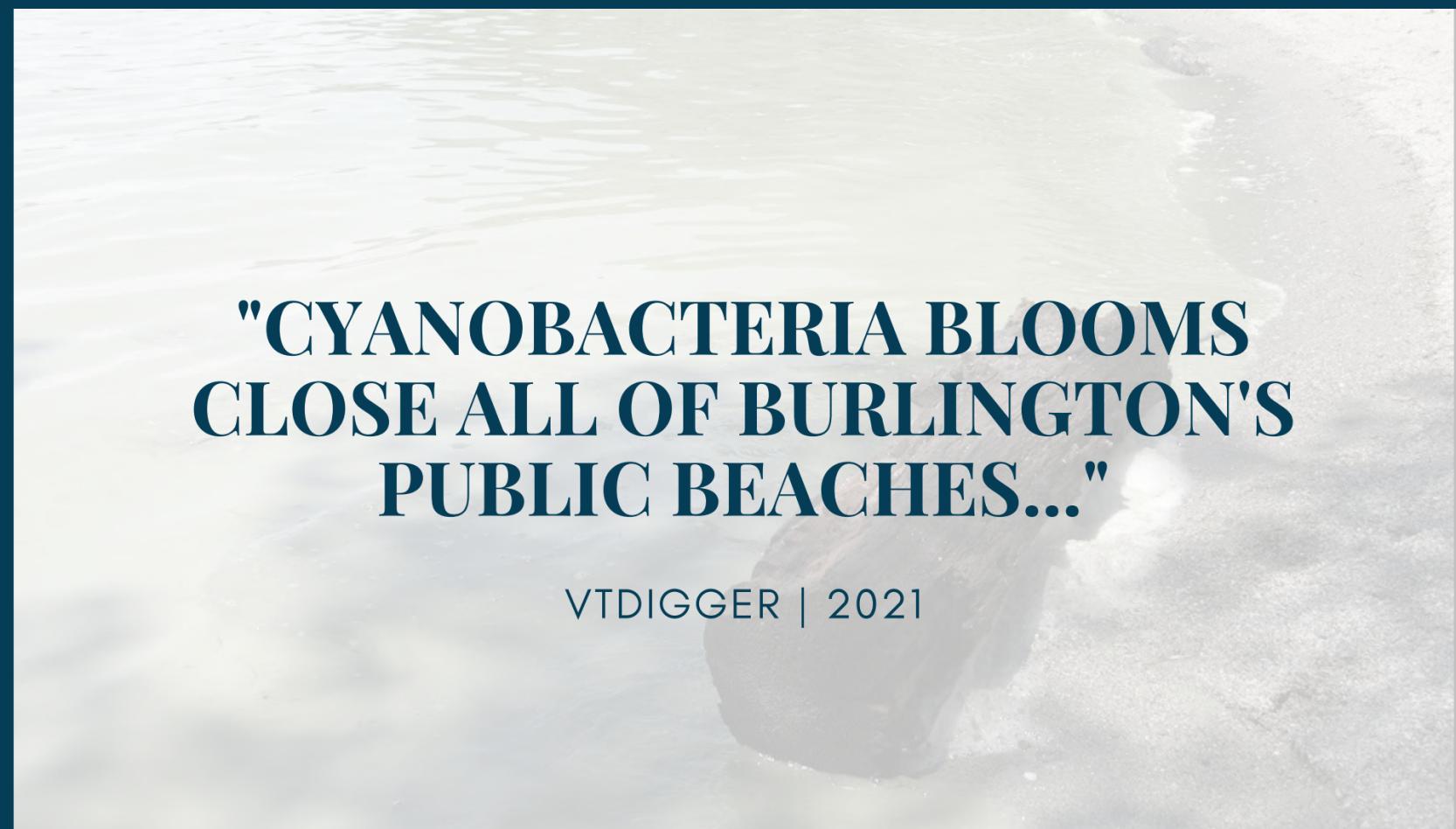
**EXCESS PHOSPHOROUS FROM
WASTEWATER &
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**IMPLEMENT PHOSPHOROUS
REDUCTIONS**



**AGING WASTEWATER &
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INFRASTRUCTURE**

**REPLACE & MODERNIZE
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**"CYANOBACTERIA BLOOMS
CLOSE ALL OF BURLINGTON'S
PUBLIC BEACHES..."**

VTDIGGER | 2021

TACKLING AGING INFRASTRUCTURE

- Completed key upgrades at all 3 wastewater treatment plants.
- Replaced the disinfection system with modern equipment.
- At Main plant, we replaced the central computer system. These were areas of our older system that led to Plant disruptions in 2018.



TACKLING AGING INFRASTRUCTURE

- Replaced 2 old pump stations which have in the past required emergency repairs - costing time and money.
- The risk of failure of a pump station is significant and these have been critical upgrades.



TACKLING AGING INFRASTRUCTURE

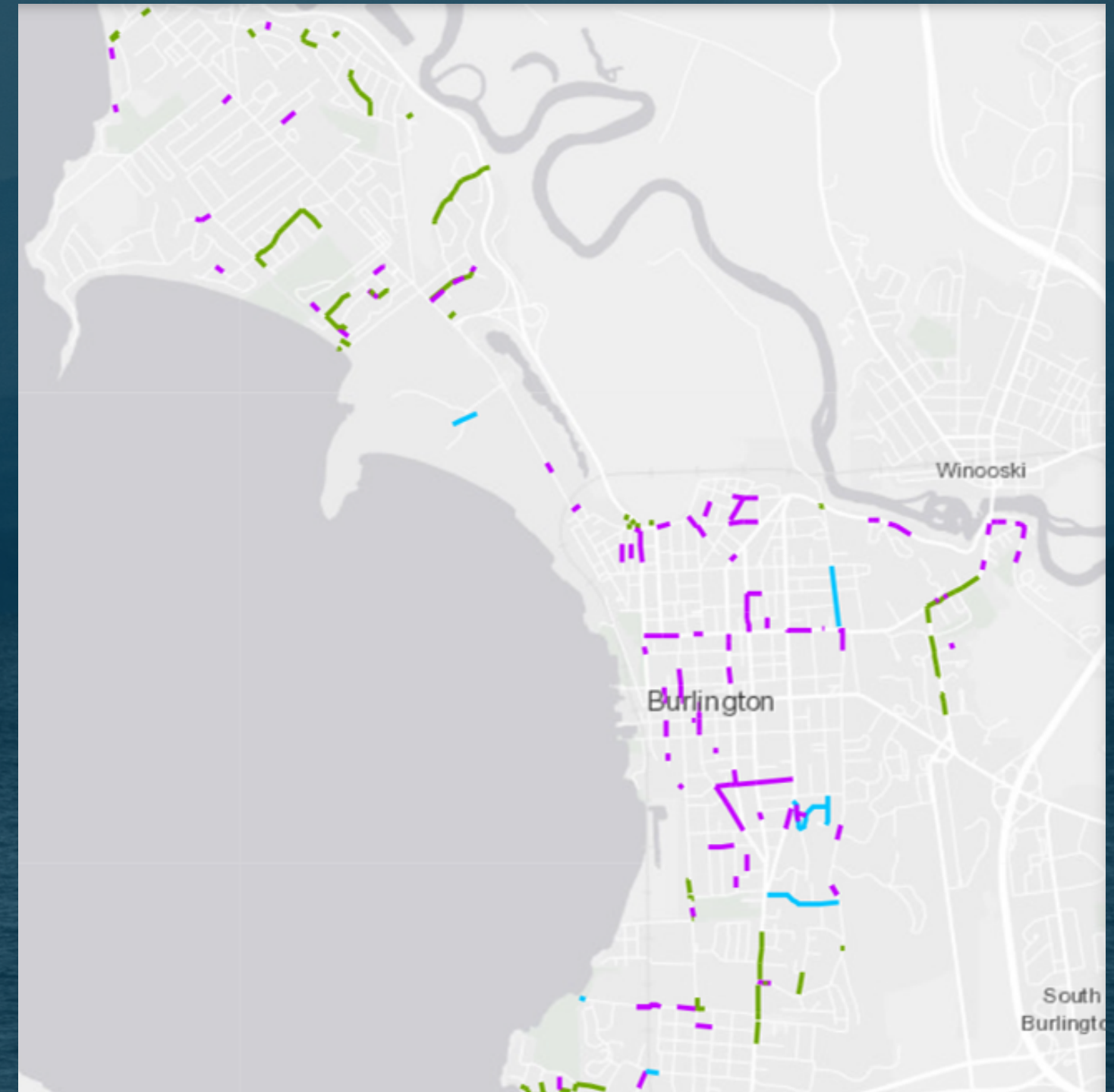
Distribution and Collection System Improvements Project

Schedule: fall 2021 to fall 2022

Scope: water, collection system, paving

- Contractor: Granite Inliner
- Designer: DPW
- Resident Engineer and Project Management: DuBois & King
- Funding Sources: State Revolving Loan Program (SRF), Remaining 2018 Water Bond Proceeds, Water Capital, Paving Capital

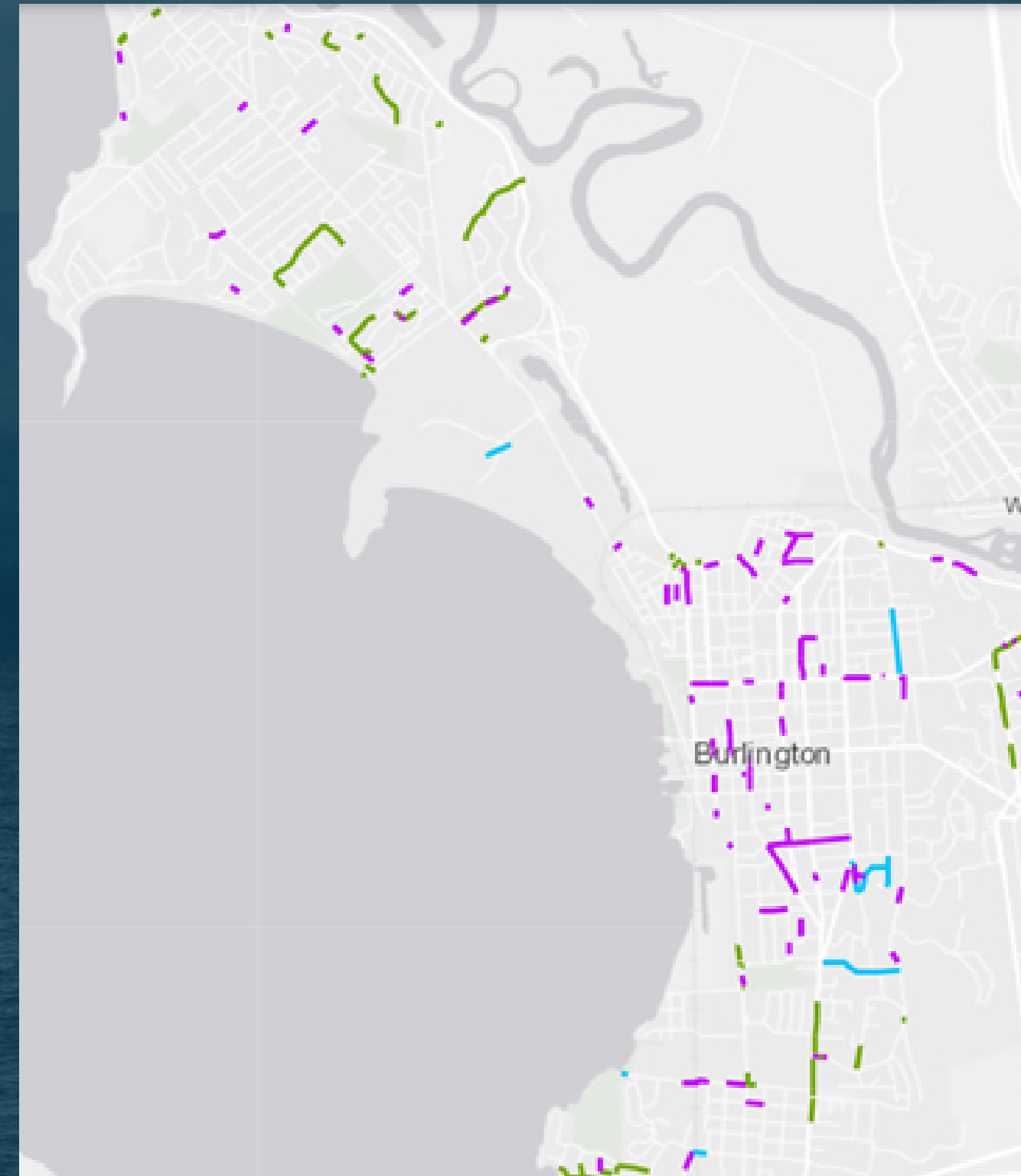
Water Pipe Rehab = ~7,600 ft.
Collection System Pipe Rehab = ~48,000 ft



TACKLING AGING INFRASTRUCTURE

Higher impact project locations for 2022:

- Water Relining: Home Ave, North Prospect Street, Ledge Road, Deforest Road, and Overlake Park (if funding is available)
- Sewer Replacement: Deforest Road, North Avenue, Riverside Avenue, Greene Street, Pine Street, Lakewood Parkway, Tallwood Lane, and West Road
- Full width paving is part of work in these locations: North Prospect, Lakewood Parkway, and Tallwood Lane



TACKLING LEGACY INFRASTRUCTURE

Installed 15 stormwater gardens as part of the \$1M of grant funding to capture and slow a significant amount of runoff above the Pine St Combined Sewer Overflow.

Last year 3 bioretention systems were constructed in the New North End by City DPW Staff and self-funded through the stormwater enterprise fund.

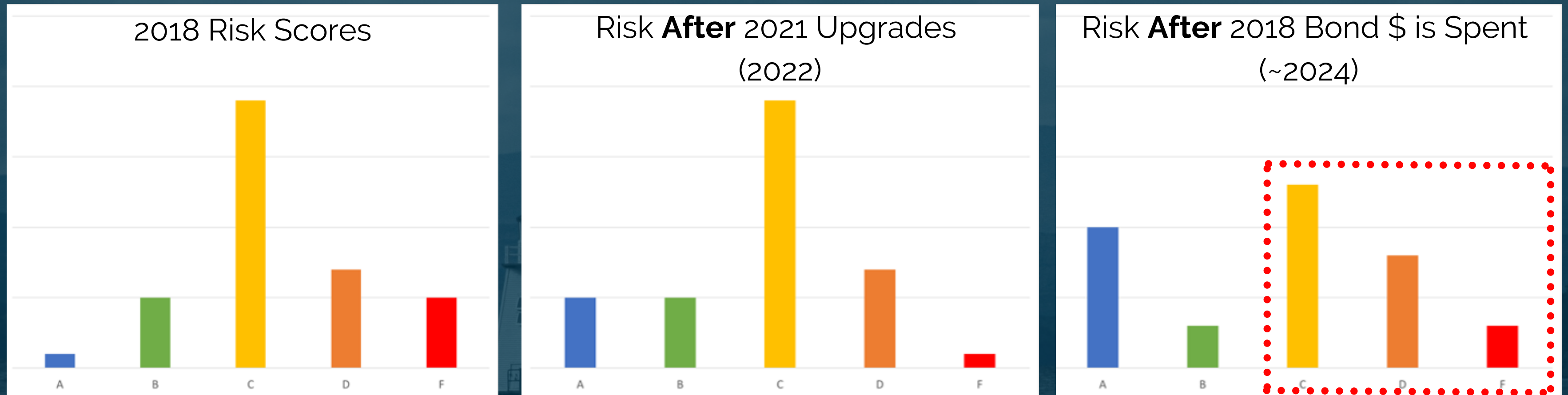


TACKLING AGING INFRASTRUCTURE



1. Wastewater Phase II Treatment Plant Improvements
2. Pump Station Improvements
3. Additional GSI
4. Stormwater Outfall Improvements

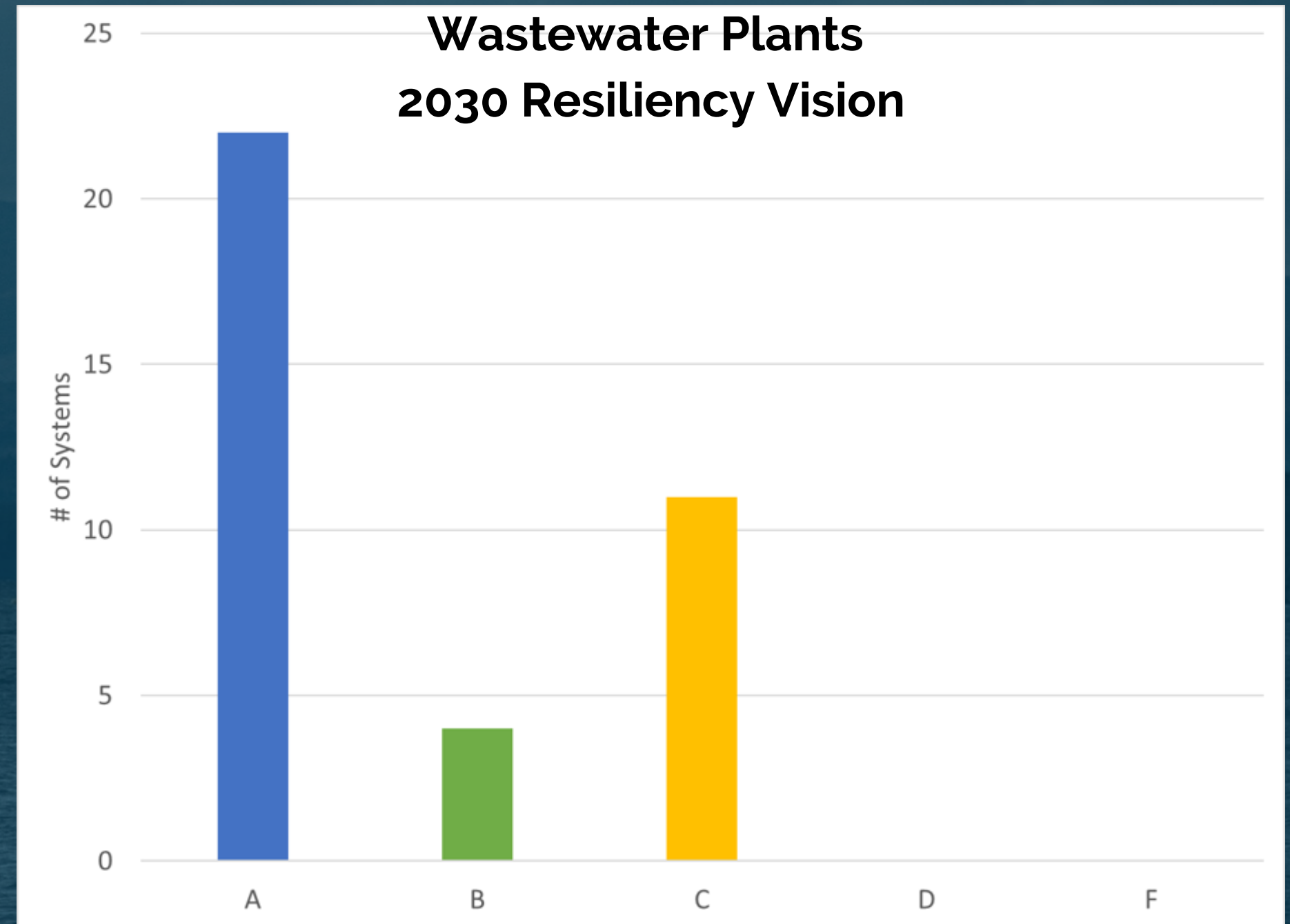
RISK SCORE DISTRIBUTION - WWTP'S



- **Replacement cost** of each system varies
- Risk scoring is **dynamic over time** - systems continue to age (i.e. something in C grade in 2022 that doesn't get replaced turns into D by 2024)

BEYOND THE 2018 CWRP BOND

- Additional **\$150MM+** needed for WWTFs alone
- On-going analysis to determine magnitude of November 2022 Bond
- Consider availability of Federal Funding (loan forgiveness?)
- Consider longer term bonds (35-50 year)
- Possibility of East Plant consolidation with Main
- Consider other infrastructure \$\$ needs too (WW, SW and Drinking Water)





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VTDIGGER | 2018

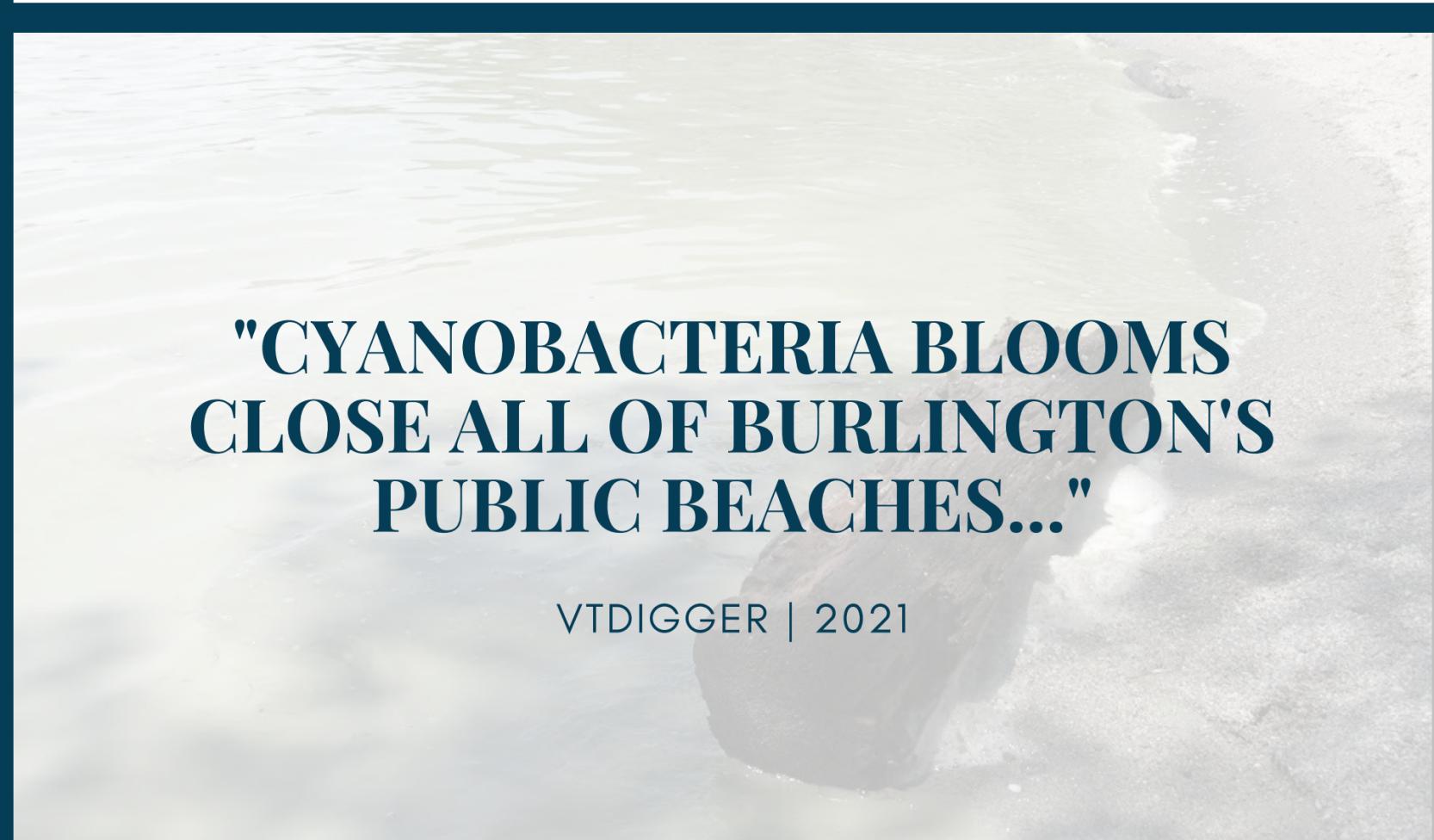
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**"CYANOBACTERIA BLOOMS
CLOSE ALL OF BURLINGTON'S
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VTDIGGER | 2021

"Cyanobacteria conditions vary significantly among lake segments, and **warm weather blooms continue to present a challenge to recreation and public health.**"

Lake Champlain Basin Program, 2021 State of the Lake Report

WHY DO BLOOMS HAPPEN?



TOO MANY NUTRIENTS
(CYANO FOOD)

+

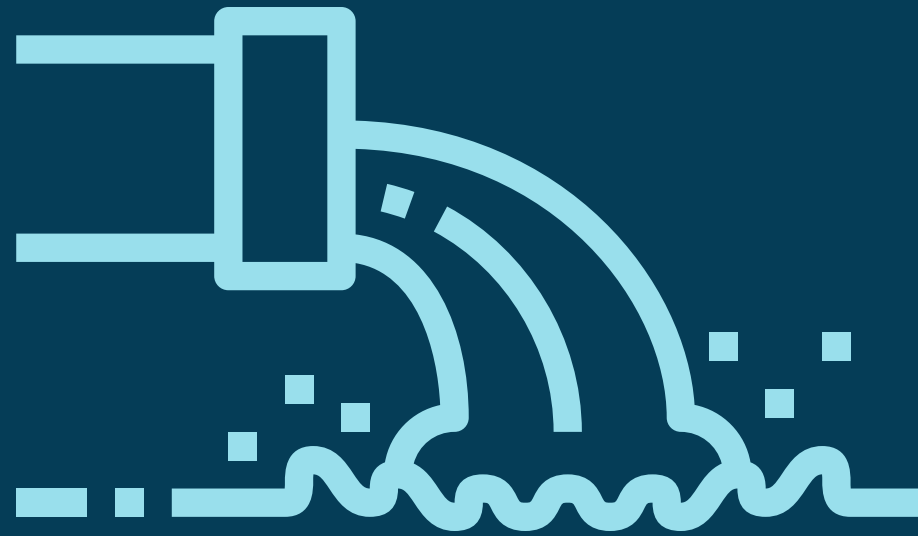
CALM, WARM WATER

=

CYANOBACTERIA BLOOM

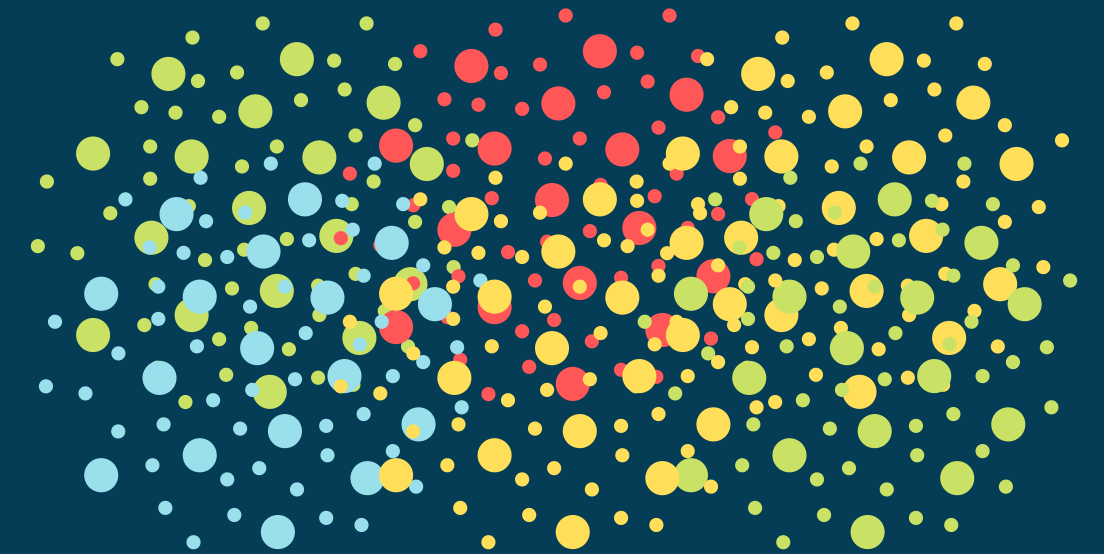
TOTAL MAXIMUM DAILY LOAD (TMDL)

WHAT IS **LOAD**?



FLOW

how much treated wastewater
or stormwater runoff enters a
waterbody each year



CONCENTRATION

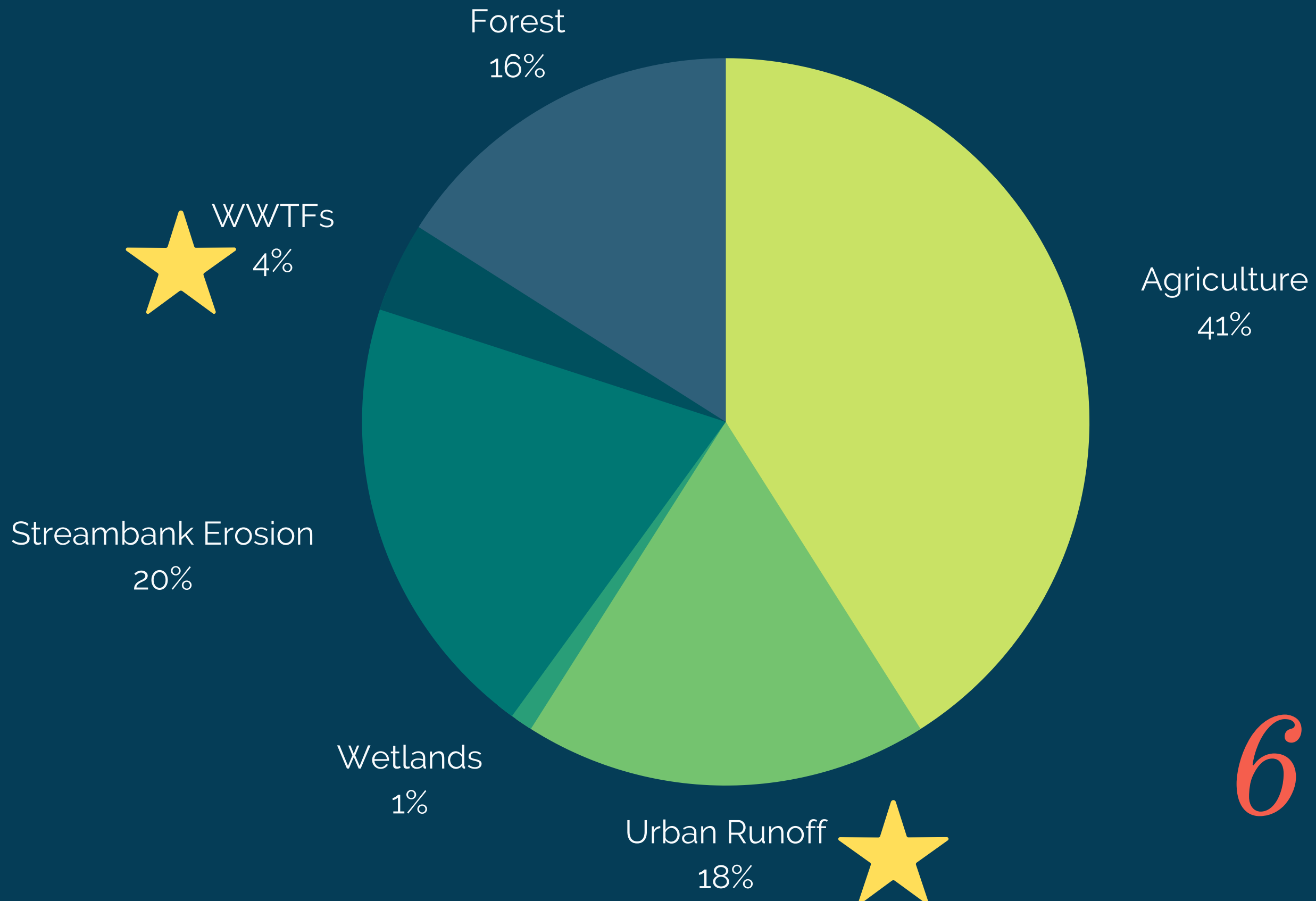
(how much **phosphorous** is
in that water)



LOAD

(how many pounds of
phosphorous is **delivered**
to the waterbody)

Sources of Phosphorus in Lake Champlain



VERMONT =
69% of the total phosphorous load to Lake Champlain

Burlington's Annual Phosphorous Contribution

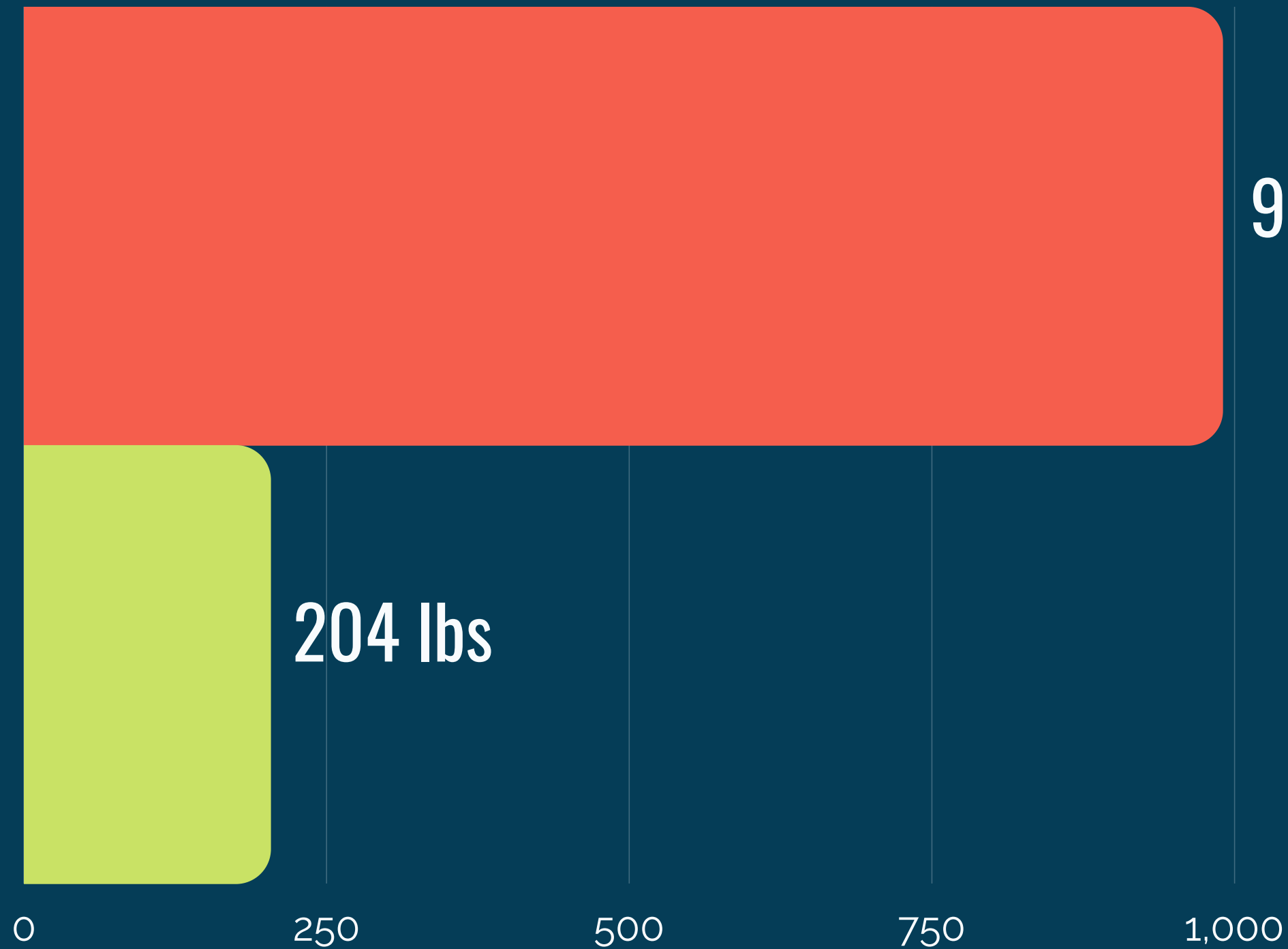


3.8%

of total phosphorous
load to applicable
segments of Lake Champlain

- Wastewater Treatment Facilities (including Wet Weather)
- Developed Lands

Burlington's Remaining Phosphorous Reduction Target* by Sector



1,102 pounds of
phosphorous per year

*Annual Average

The Economics of Lake Champlain



**IN THE U.S.,
STUDIES ESTIMATE**

\$2.2 billion

in total economic losses annually
due to eutrophication

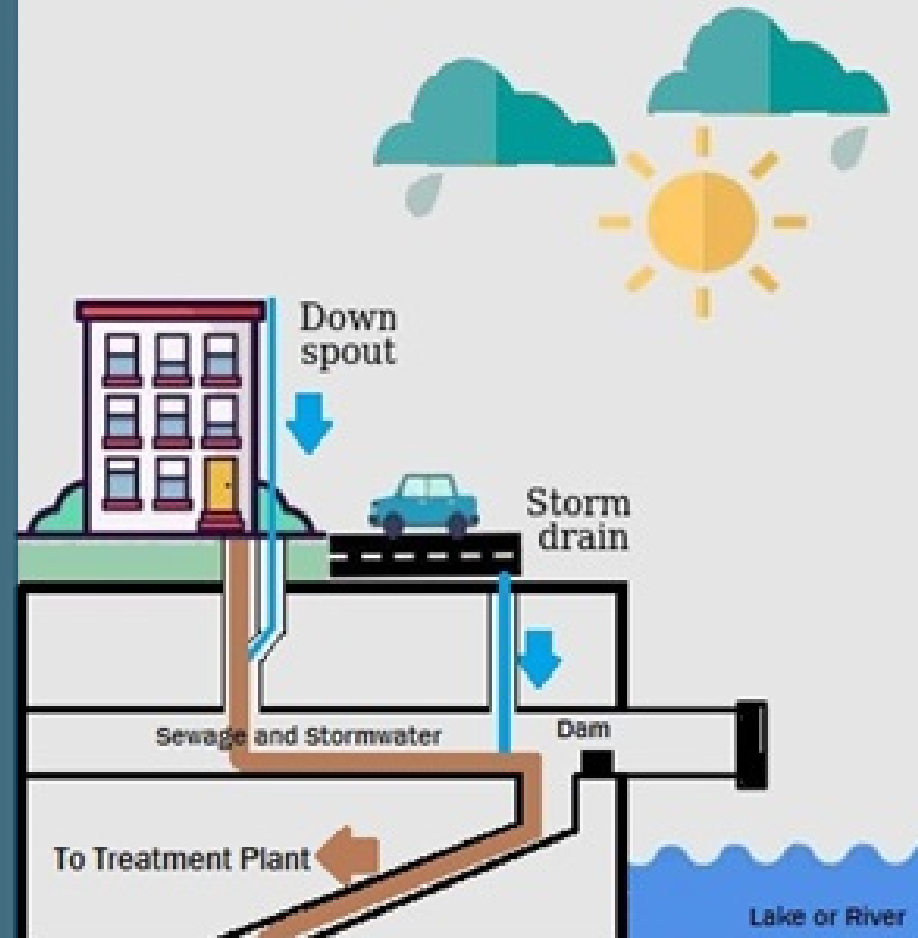
**LAKE CHAMPLAIN
GENERATES**
\$300 million

in VT tourism revenues each year



OTHER WATER QUALITY GOALS

Normal Weather Events



Extreme Weather Events



COMBINED SEWER OVERFLOWS

Remove or store stormwater to reduce frequency of CSOs

.....

EROSION & HABITAT IMPACTS ON URBAN STREAMS

Reduce excess stormwater flows



What is Integrated Planning?

JUNE 2012
U.S. EPA INTEGRATED
MUNICIPAL PLANNING
FRAMEWORK

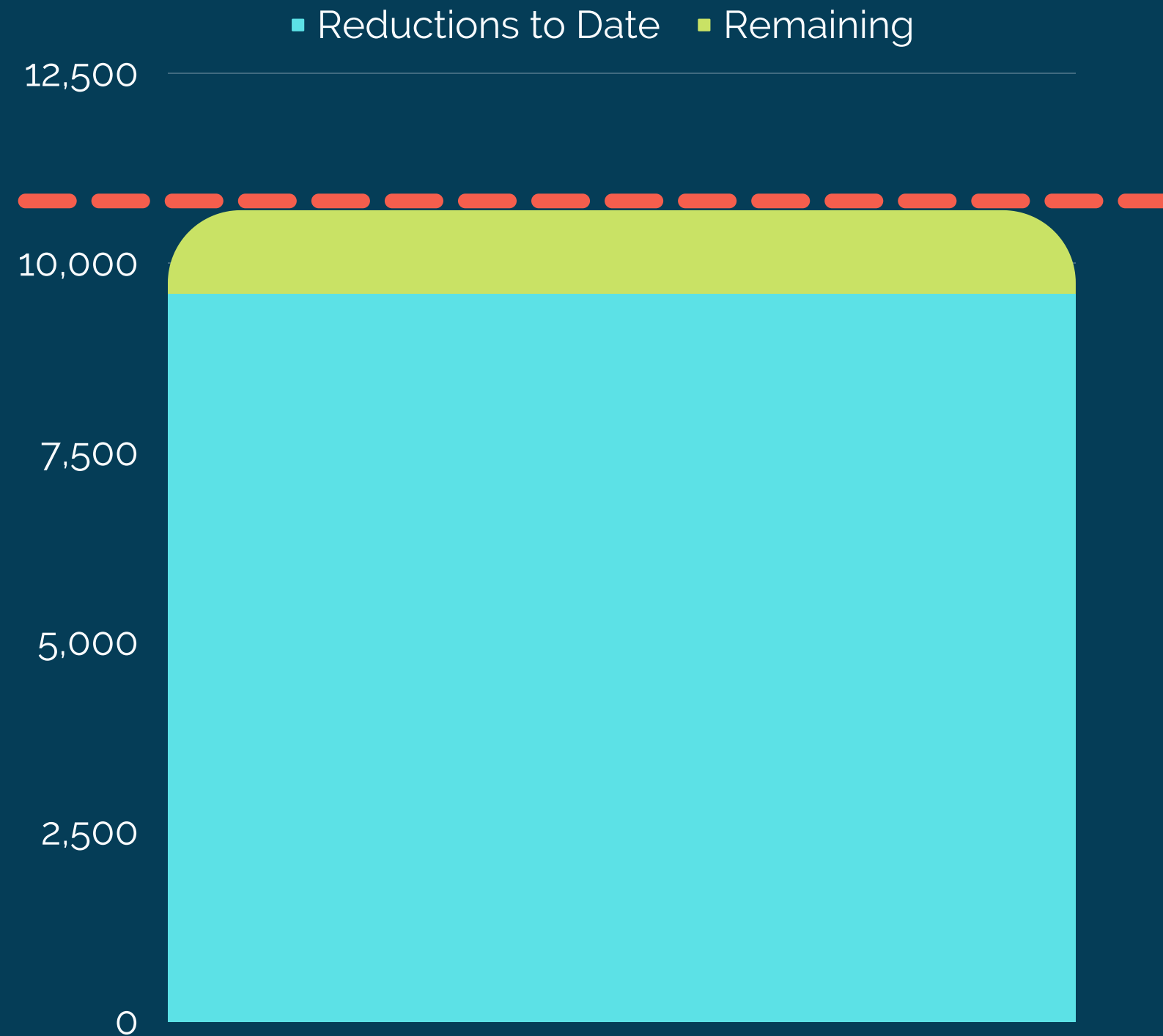


- Examine all **water quality obligations** as a whole while recognizing the need for **on-going investment in existing infrastructure**
- Identify & address community health and water quality priorities by sequencing and scheduling work with the **highest cost-benefit** and **most community support** up front
- Implement **water quality solutions** more **efficiently**, and more **cost-effectively**.

Other Northeast States utilizing IP:

- Connecticut
- Maine
- Massachusetts
- New Hampshire

Burlington's Phosphorous Reduction Goal



BASELINE GOAL=

10,684 lbs/year

PERFORMANCE TO DATE=

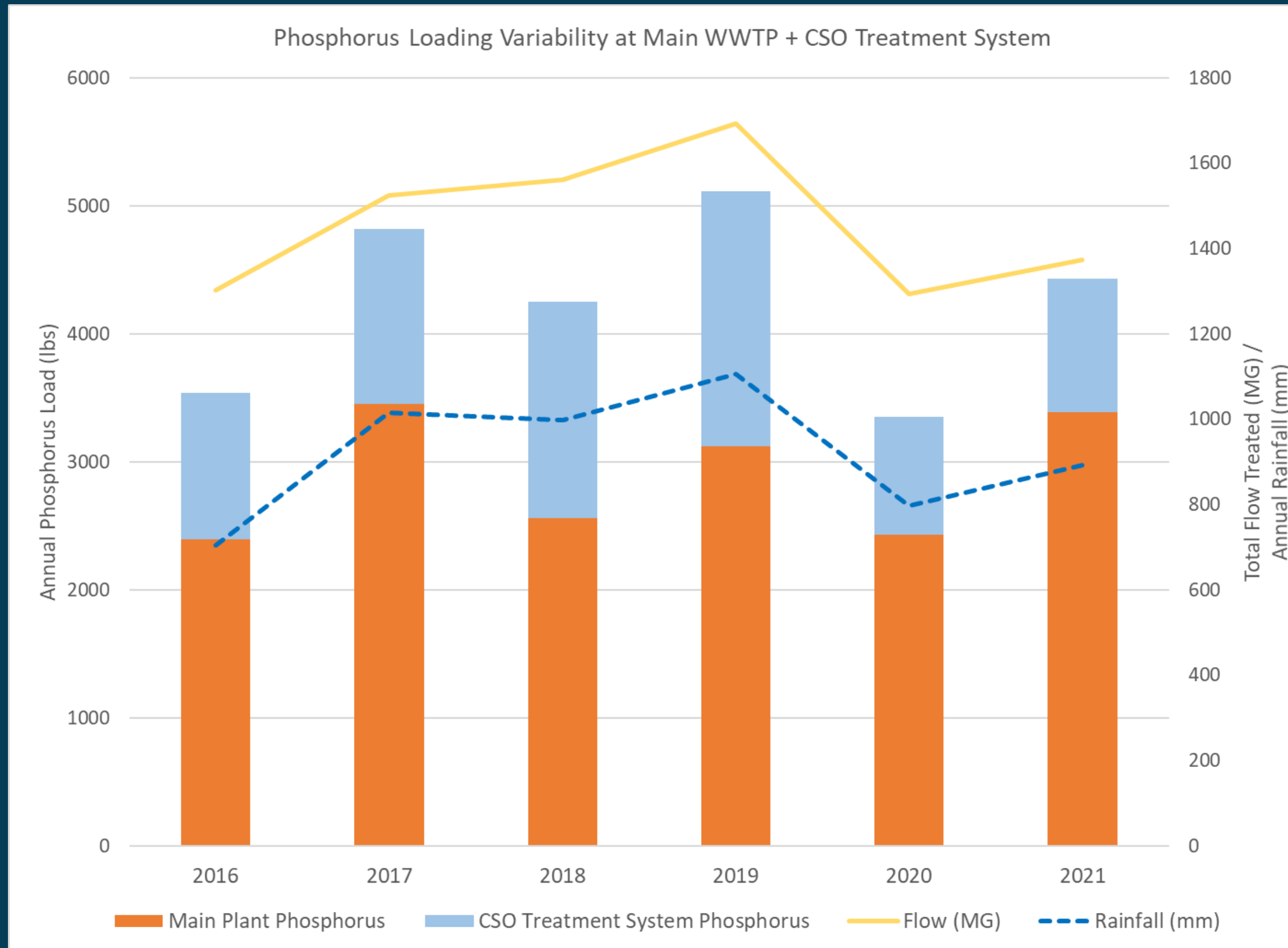
9,582 lbs/year

REMAINING TARGET*=

1,102 lbs/year

*Annual Average

Why the reduction target is "annual average"...



CREATING **PROJECT** PORTFOLIOS

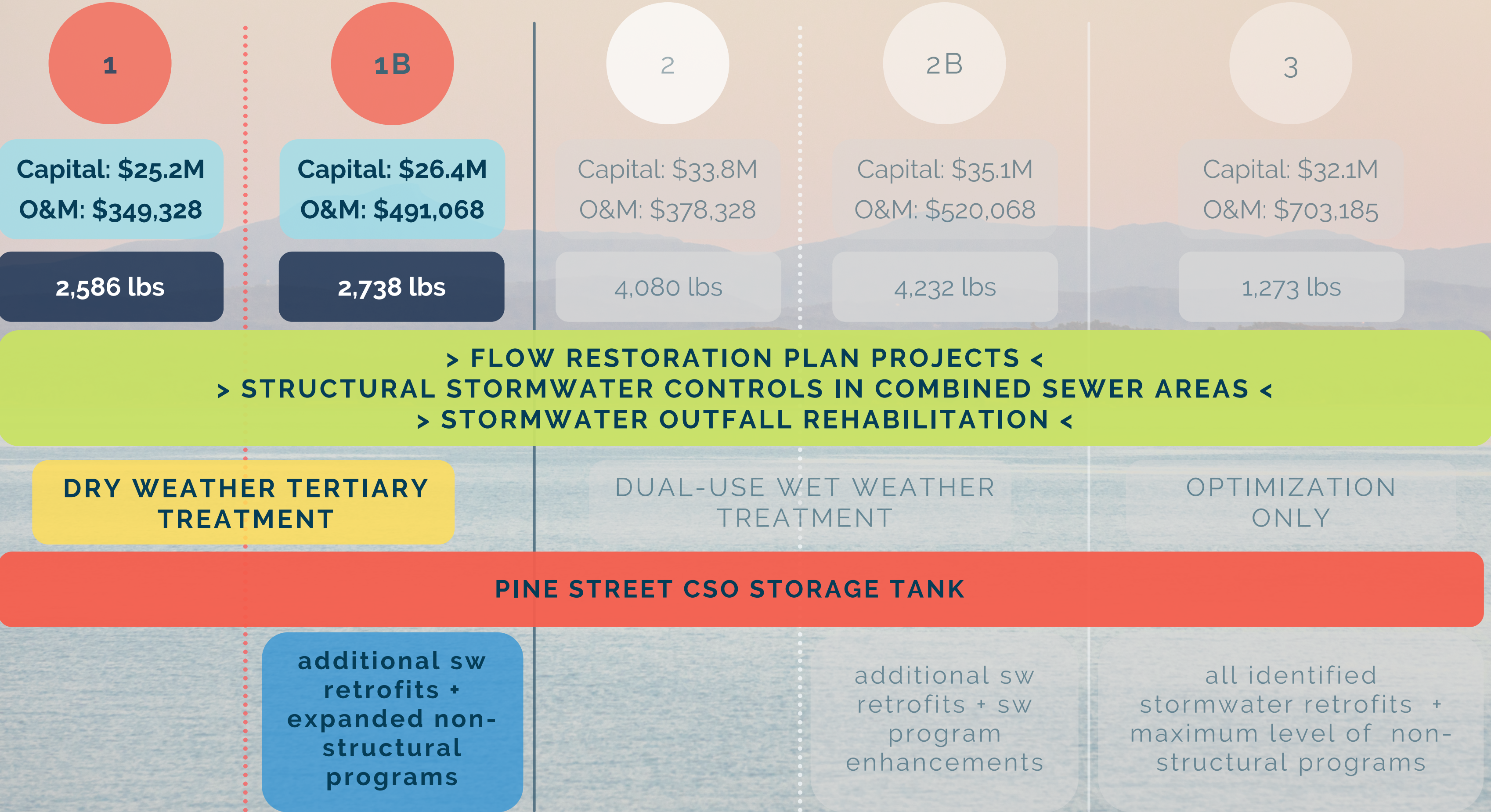
- **Engineering & Technical Analysis**
 - Watershed characterization
 - System characterization & modeling
 - Evaluating program effectiveness
 - Project-specific cost estimates
- **Combining projects** into Project Portfolios
- Developing an **Evaluator Tool** to assess the benefits and impacts of portfolio options
- Completing a **Financial Capability Assessment (FCA)** for each Portfolio



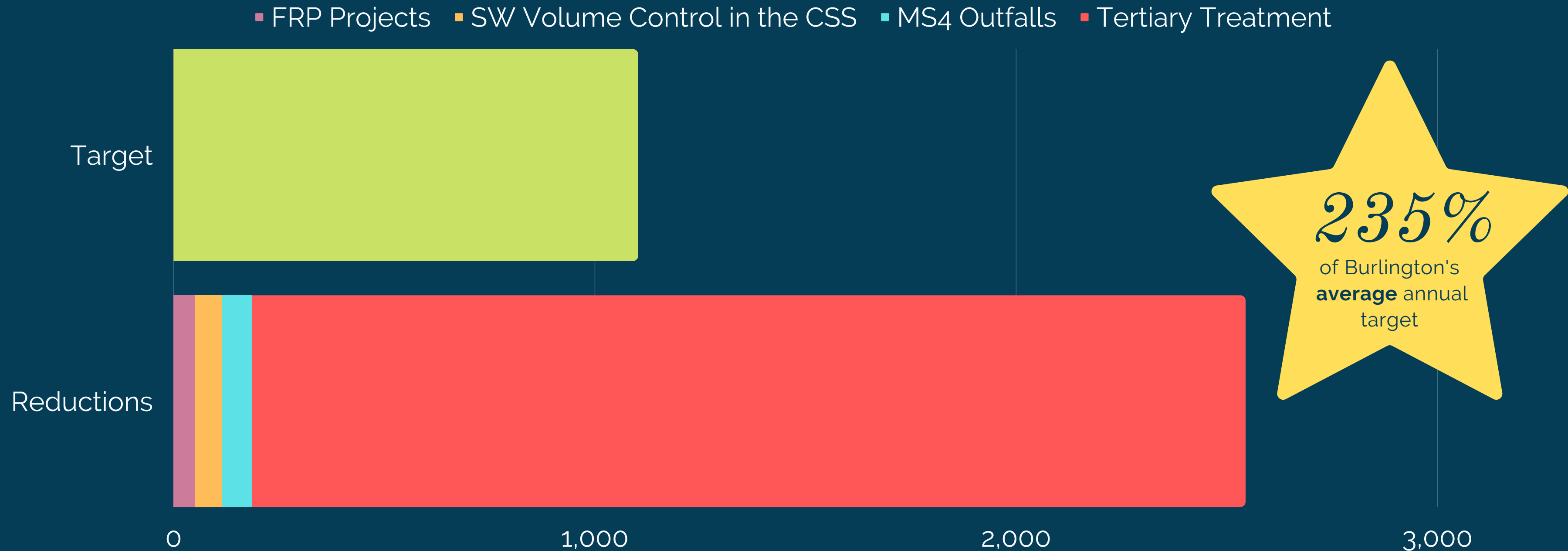
PORTFOLIO OPTIONS OVERVIEW

1	1B	2	2B	3
Capital: \$25.2M O&M: \$349,328	Capital: \$26.4M O&M: \$491,068	Capital: \$33.8M O&M: \$378,328	Capital: \$35.1M O&M: \$520,068	Capital: \$32.1M O&M: \$703,185
2,586 lbs	2,738 lbs	4,080 lbs	4,232 lbs	1,273 lbs
<div><div>> FLOW RESTORATION PLAN PROJECTS <</div><div>> STRUCTURAL STORMWATER CONTROLS IN COMBINED SEWER AREAS <</div><div>> STORMWATER OUTFALL REHABILITATION <</div></div>				
★ DRY WEATHER TERTIARY TREATMENT	DUAL-USE WET WEATHER TREATMENT		OPTIMIZATION ONLY ★	
PINE STREET CSO STORAGE TANK				
	additional sw retrofits + expanded non-structural programs		additional sw retrofits + sw program enhancements	all identified stormwater retrofits + maximum level of non-structural programs

PREFERRED PORTFOLIO



Proposed Phosphorous Performance



BEYOND PHOSPHORUS CONTROL: **CSO REDUCTIONS**

Near term:

- Pine Street CSO Storage Tank (5 year level of control)
- Additional flow metering to refine H/H model in areas with capacity concerns
- Basement Surcharge Prevention Program



BEYOND PHOSPHORUS CONTROL: URBAN STREAM FLOW RESTORATION

- **Prioritize** Flow Reduction Projects that have high Phosphorus removal
 - Gravel wetland for Price Chopper Plaza
- High **Cost Benefit** projects
 - "Smart" valve retrofit for existing detention pond
- Projects with **grant support**



Next Steps

WHAT TO EXPECT



2022-2023

DESIGN & ENGINEERING

WWTP Tertiary Pilot
Pine Street CSO Tank
H/H Work



2022

DEC PERMIT APPROVAL

Following Public
Notice Process



2023-2024

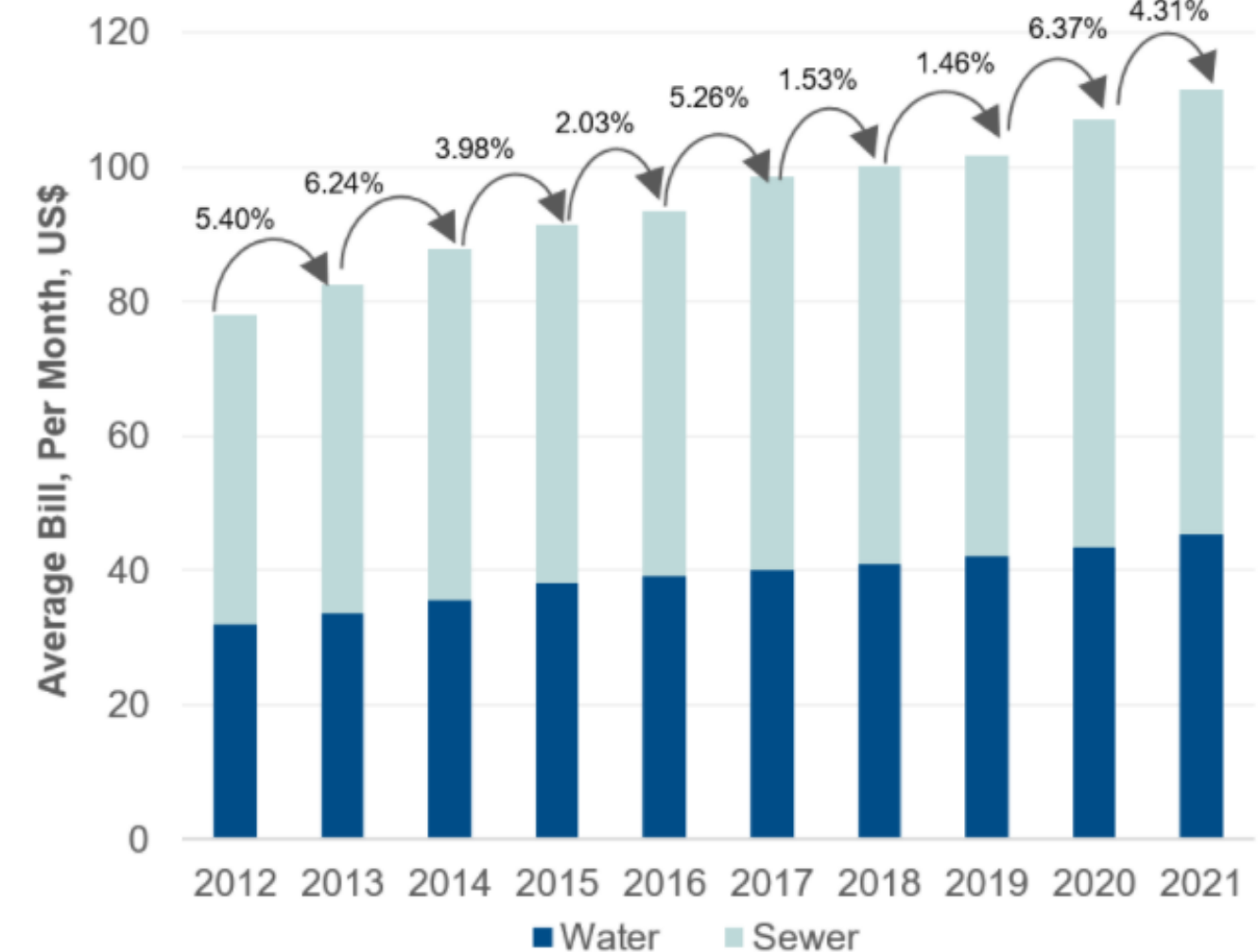
CONSTRUCTION OF PRIORITY PROJECTS

Main WWTP Tertiary
Pine Street CSO Tank

Funding Challenges

- At least \$175M + of WW/SW need
- On-going ratepayer affordability is key
- Financing vs. Funding
- Federal Infrastructure Bill will increase...
 - availability of financing
 - availability of loan forgiveness (not guaranteed)
- Drinking Water also has deferred capital needs
- Consider costs of inaction

Exhibit: Household Water and Wastewater Utility Bills for 50 U.S. Cities, 2012-2021



Source: Utilities, Bluefield Research

QUESTIONS?

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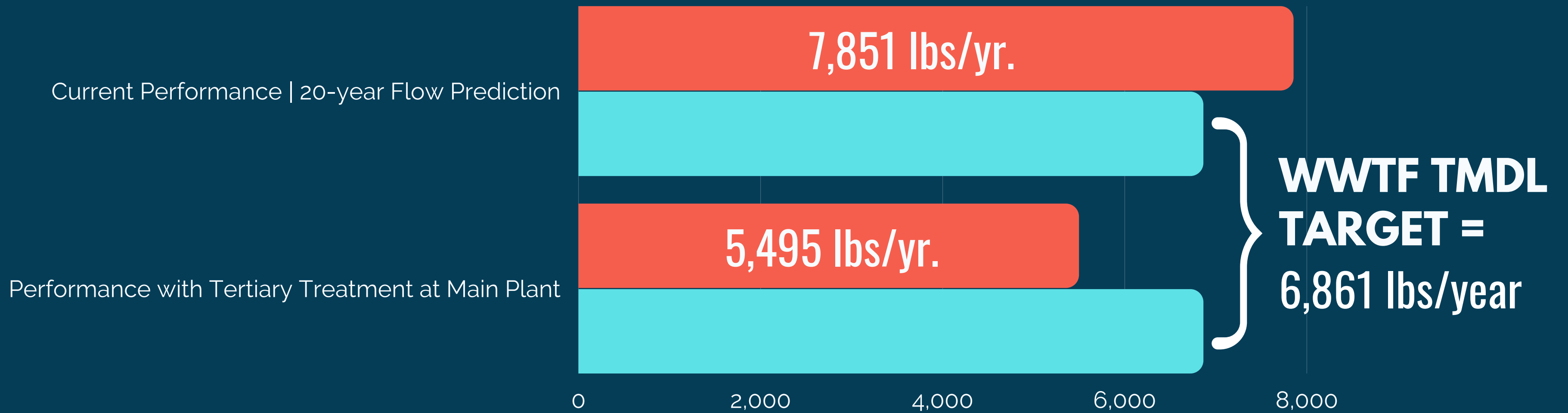
burlingtonvt.gov/water/integratedplan



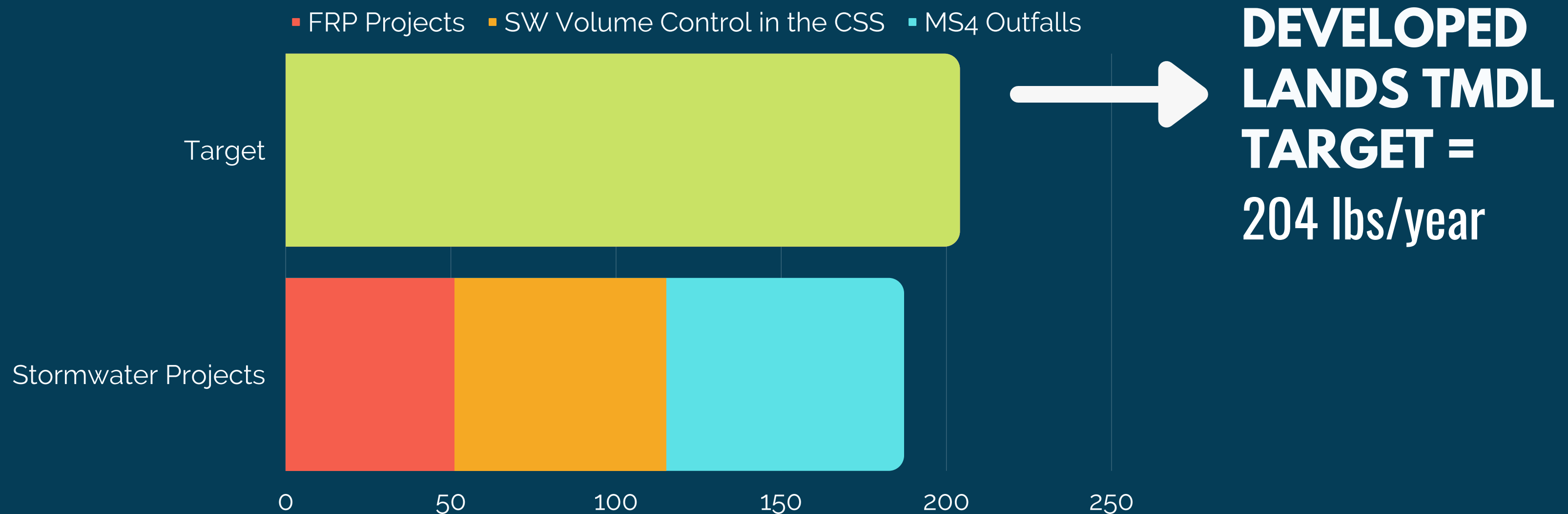


Extra slides I am
not sure we need.

Phosphorous Reduction Associated with Tertiary Treatment at Main Plant



Phosphorous Reduction Associated with Stormwater Projects



"The **monitoring and adaptive management plan...** provides a framework for continued progress towards the Plan's goals, in a manner that **meets regulatory needs, encompasses community and financial characteristics,** and **supports effective decision-making.**"

Burlington Integrated Water Resources Plan Report, 2021

Monitoring Plan & **Adaptive** Management

MEASURING SUCCESS &
EVALUATING PERFORMANCE

Performance Indicators



PROJECTS & ACTIVITIES

- Capital projects implemented
- Pollution prevention
- Conveyance system maintenance
- Treatment system maintenance



BENEFITS

- WWTP effluent characteristics
- Combined Sewer Overflows
- Sewage backups / sanitary sewer overflows
- P-load reduction
- Stream flow restoration
- Waterfront & on-water recreation
- Community engagement
- Community livability & resilience
- Clean streets



FINANCIAL IMPACT & AFFORDABILITY

- Outside resources
- Capital investments
- O&M / programmatic investments
- Affordability

Stakeholder Advisory Group

- Ad hoc committee
- Geographic representation across neighborhoods
- Organizations with interests linked to IP projects (i.e. BPRW)
- Will act as an 'intake point' for staff updates, monitoring information, financial reports, and community issues raised around IP projects
- First step in decision-making process for adaptive management

